

TETRA TECH, INC.

TECHNICAL MEMORANDUM

Basewide Groundwater Monitoring Program Report
Spring 2006 (Q2)
Installation Restoration Program Site 1
Vandenberg Air Force Base, California

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1.0 INTRODUCTION

This report documents the activities and results of the spring 2006 groundwater monitoring at Installation Restoration Program (IRP) Site 1 (Base Exchange Service Station [BXSS]), Operable Unit 6, Vandenberg Air Force Base (AFB), Santa Barbara County, California. Samples were collected at Site 1 by Tetra Tech, Inc. (Tetra Tech) during May 2006. The location of Site 1 is shown on Figure 1.

The groundwater monitoring is being completed in accordance with the Basewide Groundwater Monitoring Program (BGMP) Work Plan (Tetra Tech 2000a), the BGMP Health and Safety Plan (Tetra Tech 2000b), the Basewide Sampling and Analysis Plan (Tetra Tech 2003), the BGMP Quality Assurance Project Plan (QAPP) Addendum (Tetra Tech 2004), the Vandenberg AFB Hazardous Waste Management Plan (Vandenberg AFB 2002), and the Waste Management Plan Addendum (Tetra Tech 2005). Regulatory oversight of the work is being performed by the California Department of Toxic Substances Control and Regional Water Quality Control Board—Central Coast Region.

Site background information is summarized in Section 2.0. The scope of work and methodology for groundwater monitoring are presented in Section 3.0. The results of the quarterly monitoring are presented in Section 4.0. Quality Assurance/Quality Control is discussed in Section 5.0. Recommendations for future sampling are presented in Section 6.0.

2.0 BACKGROUND

2.1 SITE DESCRIPTION AND HISTORY

Installation Restoration Program Site 1 is located on the corner of California Boulevard and Herado Avenue in the main cantonment area at Vandenberg AFB. The BXSS has been in operation since 1967 and provides motor vehicle fuel to base residents. The site currently consists of a main office building, three gasoline dispensing islands, six automobile service bays, a four-bay car wash building, and a car wash oil-water separator (OWS).

Four 10,000-gallon, single-walled fuel underground storage tanks (USTs); one 250-gallon, single-walled waste oil UST; associated piping; and the automobile service bay OWS were installed at the BXSS in 1967 (IT Corporation [IT] 1999; Tetra Tech 1996). The automobile service bay OWS was removed in 1999 (Tetra Tech 1999). The car wash OWS, which was installed in 1976, does not produce a hazardous waste stream and is still in place (Tetra Tech 1999). Petroleum products leaked from the single-walled USTs and associated piping into the surrounding soil and groundwater. Two of the 10,000-gallon fuel USTs were subsequently removed and replaced with two 10,000-gallon, double-walled, fiberglass tanks in 1985. The two remaining 10,000-gallon, single-walled USTs and the waste oil UST were replaced with 10,000-gallon, double-walled USTs in 1991. An unknown volume of soil was also excavated during replacement of the tanks (IT 1999).

From 1980 to 1985, Battelle Corporation conducted environmental investigations at Site 1 and installed monitoring wells 1-MW-1 through 1-MW-5. After the single-walled USTs were removed from the site, the Bureau of Reclamation (BR) continued the environmental investigations to determine the extent of soil and groundwater contamination. The BR installed seven monitoring wells (BXS-MW-1 through BXS-MW-7) and drilled nine soil borings. The BR found that the highest concentration of hydrocarbon contaminated soil was in a zone approximately 10 feet below ground surface (bgs) and extending around the USTs, the old pump island, the south half of the BXSS building, and north to the cashier's booth. Pilot tests have since been conducted at the site to assess the effectiveness of site dewatering in conjunction with bioventing of impacted soil. In 1999, IT published a feasibility study to identify,

develop, and analyze remedial action alternatives and to address gasoline, benzene, toluene, ethylbenzene, and xylenes (BTEX), and methyl *tert*-butyl ether (MTBE) detected in soil and groundwater surrounding the former USTs.

A new service station is expected to open in fall 2006, and remediation is scheduled to coincide with the opening of the new station. The existing service station will be demolished at that time. In spring 2004, Water Resource Development Corporation conducted a demonstration project using their Advanced Phase Separation System for MTBE and volatile organic compound (VOC) removal from selected wells. Results from the demonstration project can be obtained by contacting the 30th Space Wing Civil Engineer Squadron, Environmental Flight, IRP (30 CES/CEVR).

2.2 HYDROGEOLOGY

Site 1 is located on an uplifted late-Pleistocene marine terrace within the Burton Mesa physiogeographic province. Groundwater typically occurs unpredictably in small lenses perched on low-permeability layers on Burton Mesa. Site geology consists of poorly graded, fine-grained sand from the surface to approximately 19 to 28 feet bgs. Within the sand, a discontinuous clay layer was encountered. The 2- to 4-foot-thick clay layer is found at depths of 12 to 16 feet and consists of silty clay and clayey sand. The upper clay layer is not expected to act as a barrier to groundwater movement within the perched aquifer due to its discontinuity. A deeper, continuous clay bed, which ranges in thickness from 4 to 5 feet, was encountered at a depth of approximately 19 feet under the east side of the site and extends to a depth of 28 feet northwest of the BXSS (IT 1999). The perched groundwater at Site 1 is typically found from approximately 9 feet bgs to the deep clay bed, which slopes toward the northwest (IT 1999). Sand and gravel encountered during drilling investigations below the deep clay bed were found to be unsaturated.

The shallow saturated zone below Site 1 is unconfined and ranges in thickness from approximately 10 to 21 feet. Based on site groundwater monitoring data collected from 1997 to 2005, groundwater generally flows northwest with elevations ranging from approximately 444 to 451 feet above mean sea level (msl). Groundwater levels measured in May 2006 indicate the groundwater elevation ranged from approximately 445 to 451 feet above msl (Table 1). During spring 2006, the interpreted direction of groundwater flow was generally to the northwest with a gradient ranging from 0.02 to 0.04 feet per foot (Figure 1).

3.0 SCOPE OF WORK

The work performed during spring 2006 at Site 1 included measuring groundwater elevations, collecting groundwater samples for laboratory analyses, and preparing this report.

3.1 GROUNDWATER MONITORING METHODOLOGY

Thirteen wells were sampled at Site 1 during spring 2006. Dedicated MicroPurge pumps and Grundfos pumps were used for purging wells BXS-MW-1 through BXS-MW-3, BXS-MW-5 through BXS-MW-7, and BXS-MW-13 through BXS-MW-19. Duplicate samples were collected from wells BXS-MW-1 and BXS-MW-17. Sampling was conducted in accordance with the documents cited in Section 1.0. Measured groundwater elevations are presented in Table 1, and groundwater contours are illustrated on Figure 1. Purge records are provided in Appendix A.

In general, wells were purged until a minimum of one pump and tubing volume of water (for MicroPurge pumps) or a minimum of three well volumes of water (for Grundfos pumps) were removed and water quality parameters had stabilized. Criteria for determining stabilization are three successive

measurements of temperature within ± 1 degree Celsius, pH within ± 0.1 , conductivity within ± 5 percent, and a turbidity reading of less than 5 nephelometric turbidity units (NTUs). In cases where stability or a turbidity reading of less than 5 NTUs was not obtained, samples were collected after purging a minimum of five pump and tubing volumes of water (for MicroPurge pumps) or a minimum of five well volumes of water (for Grundfos pumps).

3.1.1 MicroPurge Groundwater Sampling

MicroPurge sampling was conducted at monitoring wells BXS-MW-1, BXS-MW-6, BXS-MW-13, BXS-MW-14, and BXS-MW-16 through BXS-MW-18. The pumping rates were calibrated for each well prior to purging to maintain a static water level (i.e., minimal drawdown). Due to high turbidity, wells BXS-MW-1, BXS-MW-6, BXS-MW-13, BXS-MW-17, and BXS-MW-18 were sampled after purging a minimum of five pump and tubing volumes of water.

3.1.2 Standard Groundwater Sampling

A 2-inch Grundfos pump was used for purging groundwater at wells BXS-MW-2, BXS-MW-3, BXS-MW-5, BXS-MW-7, BXS-MW-15, and BXS-MW-19. Wells BXS-MW-3, BXS-MW-5, BXS-MW-15, and BXS-MW-19 were purged dry and sampled after sufficient recharge. Due to high turbidity, well BXS-MW-2 was sampled after purging more than five well volumes of water. Samples were collected using disposable Teflon bailers.

4.0 RESULTS

Temperature, conductivity, pH, and turbidity were measured in the field during purging. Field measurements are presented in Appendix A. Readings taken immediately prior to sampling are presented in Table 2. Fixed laboratory analyses were performed by EMAX Laboratories, Inc. in Torrance, California. Samples were analyzed according to the work plan (Tetra Tech 2000a) for total petroleum hydrocarbons as gasoline (TPHg) by U.S. Environmental Protection Agency (EPA) method SW8015B and VOCs by EPA method SW8260B. Laboratory analyses and data validation were conducted according to the QAPP Addendum (Tetra Tech 2004). Data validation was performed on 100 percent of the analytical data. Results are presented in Tables 3 and 4, and on Figure 2. Historical data for key contaminants of concern (COCs) are presented in Table 5 and on Figures 3A and 3B. Figure 3A contains data for key COCs from October 1998 through fall 2003 and Figure 3B contains data for key COCs from spring 2004 to present. Hydrographs showing historic benzene and MTBE concentrations for wells BXS-MW-1, BXS-MW-5, BXS-MW-6, and BXS-MW-18 are presented on Figure 4. Chain-of-custody records are provided in Appendix B.

4.1 TOTAL PETROLEUM HYDROCARBONS

Total petroleum hydrocarbons as gasoline were detected in groundwater collected from six wells during spring 2006. The highest concentration (83 mg/L) was detected in groundwater from well BXS-MW-2 and is above the Vandenberg AFB Leaking Underground Fuel Tank (LUFT) action level for TPH in groundwater of 1 mg/L (Table 3). In addition, concentrations detected in both the parent and duplicate samples from well BXS-MW-1 and in the sample from well BXS-MW-5 were above the LUFT action level for TPH in groundwater. All TPHg concentrations were within the historic range for each well, with the following exceptions. The TPHg concentrations in groundwater from wells BXS-MW-6 and BXS-MW-7 have been generally decreasing since spring 2002. The TPHg concentrations in groundwater from well BXS-MW-2 show a generally increasing trend since spring 2004. Well BXS-MW-2 was added to the BGMP during spring 2004. Prior to being sampled under the BGMP, groundwater from well

BXS-MW-2 had not been analyzed since the September 1996 sampling event conducted by IT. Concentrations of TPHg in groundwater from well BXS-MW-5 increased from 0.92 mg/L during fall 2005 to 11 mg/L during spring 2006. Prior to this, concentrations had been generally decreasing since spring 2002.

4.2 VOLATILE ORGANIC COMPOUNDS

Groundwater from seven wells contained VOCs at concentrations above the primary maximum contaminant levels (MCLs) (Table 4 and Figure 2). The highest concentrations of VOCs were detected in groundwater from wells BXS-MW-2, BXS-MW-5, and BXS-MW-18.

Benzene was detected at concentrations above the MCL of 1 µg/L in groundwater from wells BXS-MW-1, BXS-MW-2, BXS-MW-5, BXS-MW-6, BXS-MW-7, and BXS-MW-18. The highest benzene concentration (3,100 micrograms per liter [$\mu\text{g}/\text{L}$]) was detected in groundwater from well BXS-MW-2. The approximate distribution of benzene in groundwater is shown on Figure 3B. Benzene concentrations in groundwater from wells BXS-MW-1, BXS-MW-2, BXS-MW-5, BXS-MW-6, BXS-MW-7, and BXS-MW-18 have generally been decreasing (Table 5). Figure 4 illustrates these trends for wells BXS-MW-1, BXS-MW-5, BXS-MW-6, and BXS-MW-18.

The compound MTBE was detected at a concentration above the MCL of 13 µg/L in groundwater from wells BXS-MW-1, BXS-MW-5, BXS-MW-18, and BXS-MW-19. The highest MTBE concentration (1,100 µg/L) was detected in groundwater from well BXS-MW-5. Concentrations of MTBE have been generally decreasing in groundwater from wells BXS-MW-1, BXS-MW-5, BXS-MW-6, BXS-MW-7, and BXS-MW-18 (Figure 4). The compound MTBE was detected below the MCL for the first time in groundwater from well BXS-MW-6.

Toluene was detected above the MCL of 150 µg/L in groundwater from wells BXS-MW-2 and BXS-MW-5. The highest toluene concentration (13,000 µg/L) was detected in groundwater from well BXS-MW-2. The compound TBA was detected above the Department of Health Services notification level of 12 µg/L in groundwater from three wells. The highest concentration of TBA (260 µg/L) was detected in groundwater from well BXS-MW-5. In addition, ethylbenzene, *o*-xylene, and *m,p*-xylenes were detected above their relevant MCLs in groundwater from well BXS-MW-2 at concentrations of 2,900, 4,700, and 13,000 µg/L, respectively.

Groundwater from well BXS-MW-2 contained the highest concentrations of benzene, ethylbenzene, toluene, *m,p*-xylenes, and *o*-xylene. MTBE was not detected in groundwater from this well. BTEX have been detected in groundwater from well BXS-MW-2 at concentrations above MCLs without corresponding elevated levels of MTBE or *tert*-butanol (TBA) for five sampling events since being incorporated into the BGMP during spring 2004. This may indicate the existence of an old tank or piping leak that precedes the use of MTBE as a gasoline additive.

Ethylbenzene concentrations in groundwater from wells BXS-MW-6 and BXS-MW-18 have been generally decreasing since fall 2003 and fall 2002, respectively (Table 5). Toluene concentrations in groundwater from well BXS-MW-6 decreased from 4,900 µg/L during fall 2004 to below the detection limit during spring 2006. Decreases of the same magnitude occurred for *o*-xylene and *m,p*-xylenes in groundwater from this well (Table 5). Concentrations of *o*-xylene and *m,p*-xylenes detected in groundwater from well BXS-MW-2 during spring 2006 represent historical highs. Fluctuations of benzene, toluene, *o*-xylene, and *m,p*-xylenes concentrations in groundwater from well BXS-MW-5 between winter 2005 and spring 2006 correlate strongly with groundwater elevations at this well during the same period (Table 5 and Figure 4). There are no apparent correlations between groundwater

elevations and contaminant concentrations in groundwater from wells BXS-MW-1, BXS-MW-6, and BXS-MW-18 (Figure 4). Concentrations of all other key COCs detected at Site 1 during spring 2006 were similar to those previously detected.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

All of the analytical data presented in this report have been validated according to the QAPP Addendum (Tetra Tech 2004). The data validation process includes review of sample preservation, temperature, and hold times; detection and quantitation limits; instrument calibration; and equipment blank, trip blank, method blank, laboratory control sample, and matrix spike/matrix spike duplicate. Data validation qualifiers and comments are provided on the data tables to indicate the results of the data validation and to quantitatively indicate the usability of the data. In addition, field sampling records are reviewed to assess the potential for any field conditions to adversely impact the data quality.

The acetone result from the groundwater sample from well BXS-MW-3 was qualified for blank contamination due to acetone detected in the associated field blank. This discrepancy is considered minor and does not significantly impact the data quality or interpretations presented in this report. The data quality objectives for the spring 2006 sampling at Site 1 were achieved.

6.0 RECOMMENDATIONS

Tetra Tech, the Air Force, and the State regulators are currently planning a meeting to discuss groundwater gradient and contamination migration issues for this site.

Semiannual monitoring at Site 1 will continue in fall 2006 according to the Final BGMP Work Plan (Tetra Tech 2000a).

7.0 REFERENCES

IT Corporation (IT)

1999 *Feasibility Study for the Base Exchange Service Station, Operable Unit 6, Vandenberg Air Force Base (AFB), California. Draft Final.* Prepared for the United States Army Corps of Engineers.

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2000b *Basewide Groundwater Monitoring Program Health and Safety Plan Addendum.* Prepared for 30 CES/CEV, Installation Restoration Program, Vandenberg Air Force Base, California, and Headquarters Air Force Space Command, Peterson AFB, Colorado. December.

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2003 *Final Basewide Sampling and Analysis Plan.* Prepared for 30 CES/CEV Installation Restoration Program, Vandenberg Air Force Base, California, and Headquarter Air Force Space Command, Peterson Air Force Base, Colorado. September.

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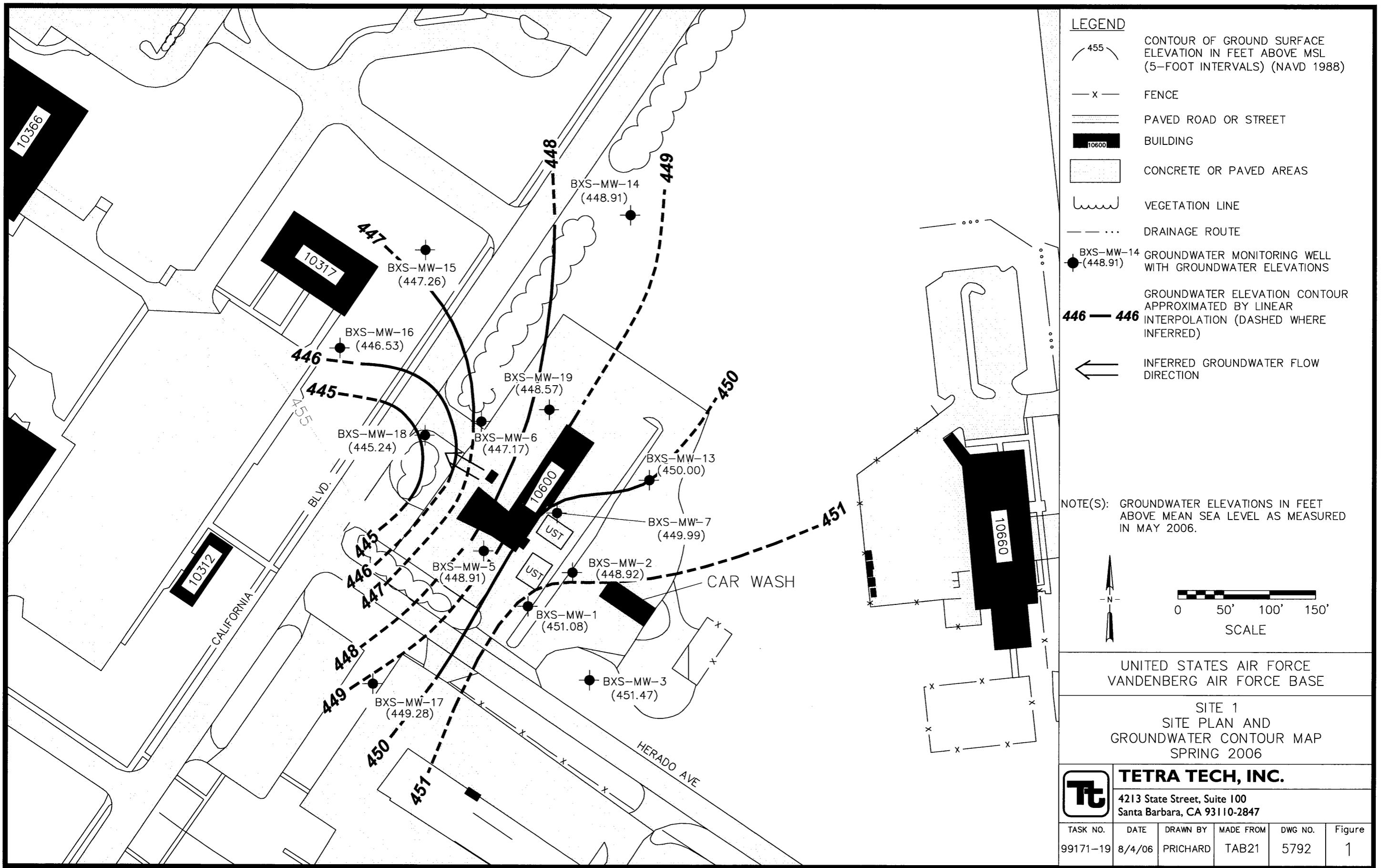
2004 *Basewide Groundwater Monitoring Program Quality Assurance Project Plan Addendum. Final.* Prepared for Department of the Air Force 30 CES/CEVR, 806 13th Street, Suite 116, Vandenberg Air Force Base, California and Department of the Air Force, Air Force Center for Environmental Excellence, DERA Restoration Division, 3300 Sidney Brooks, Brooks City-Base, Texas. July.

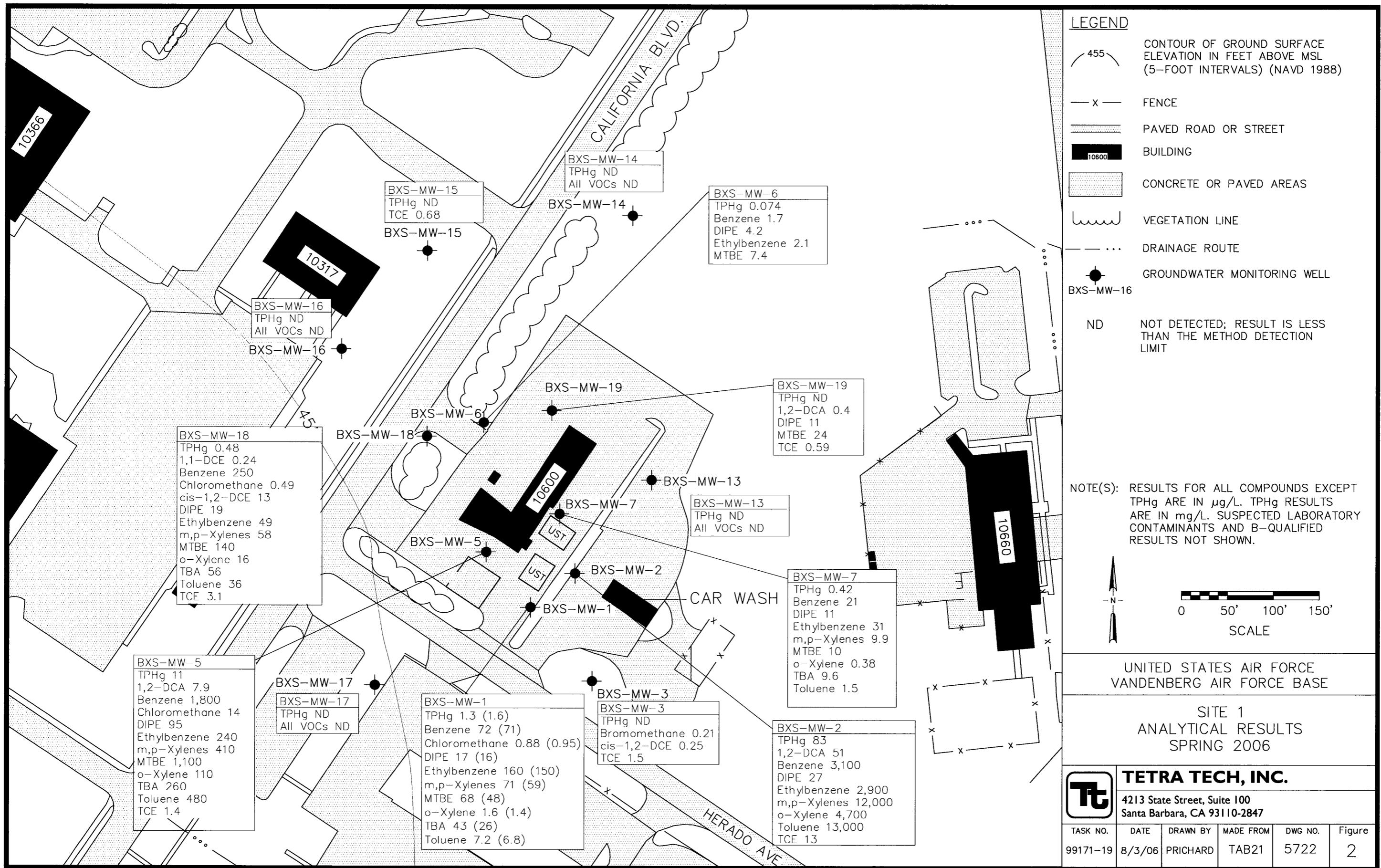
Tetra Tech, Inc.

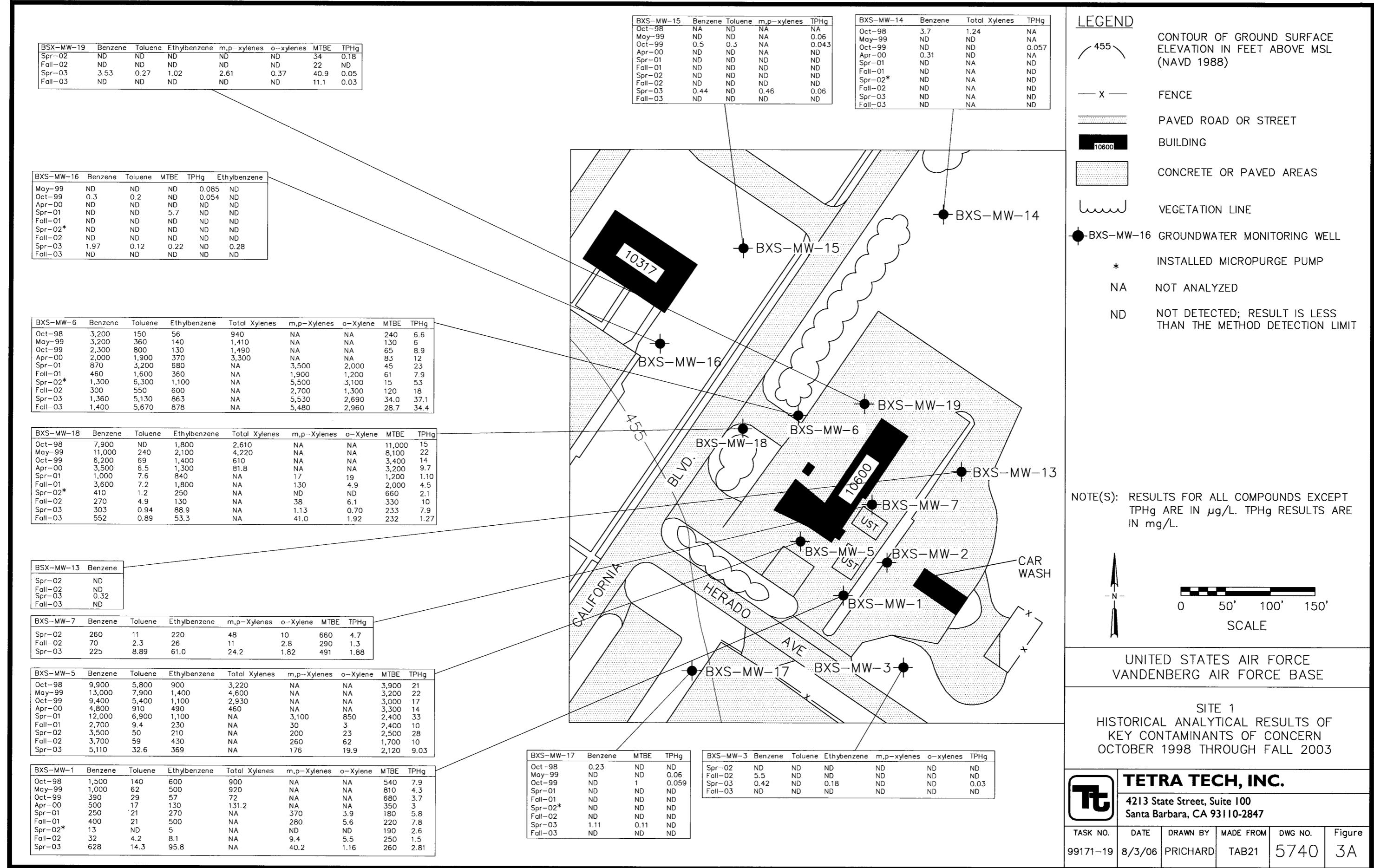
2005 *Waste Management Plan Addendum. Final.* 730 CES/CEVR, Installation Restoration Program, Vandenberg AFB, California, and Headquarters Air Force Space Command, Peterson Air Force Base, Colorado. February.

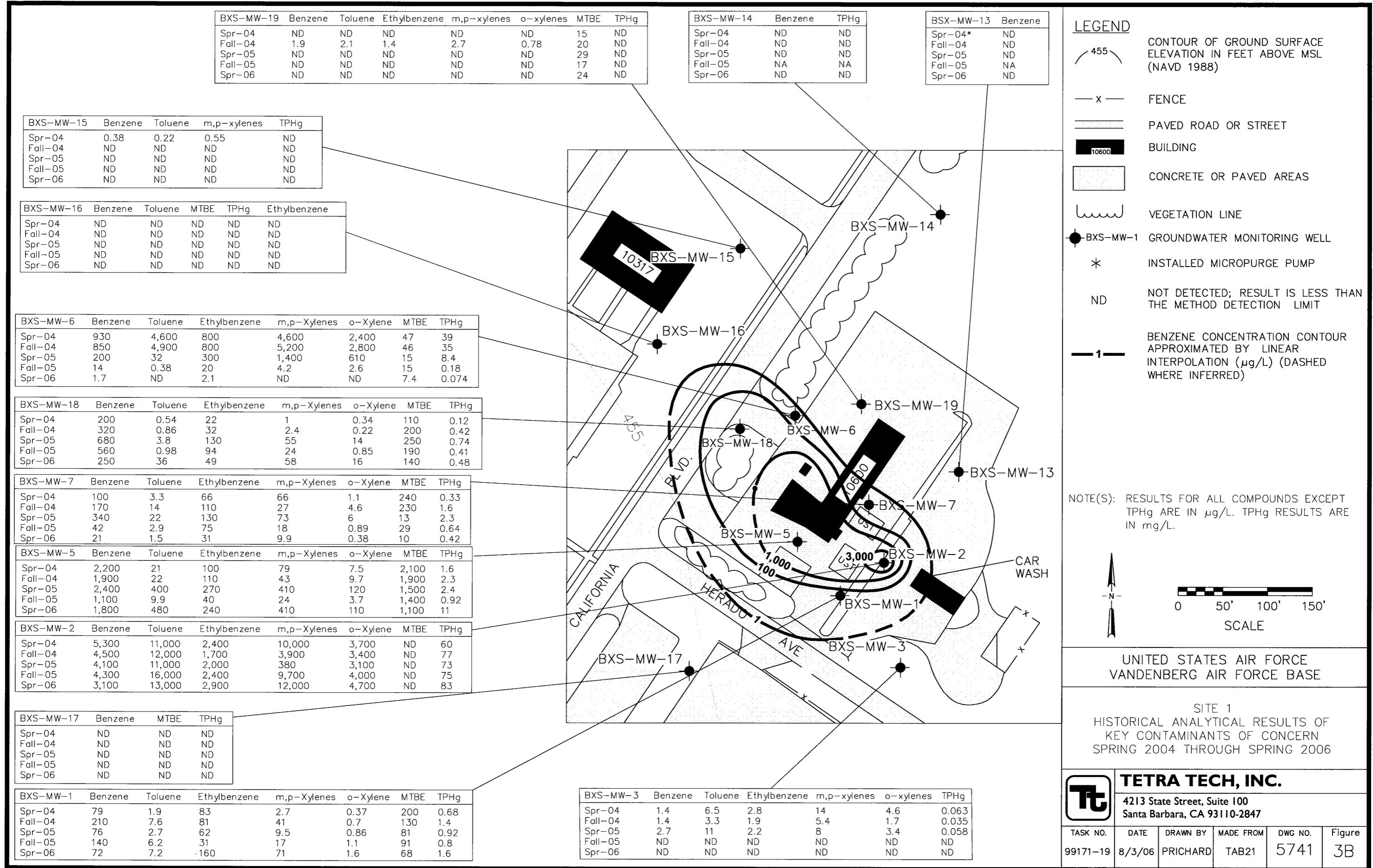
Vandenberg Air Force Base (AFB)

2002 *Headquarters Thirtieth Space Wing, Vandenberg AFB, California. Hazardous Waste Management Plan, 30 SW Plan 32-7043-A, Change 1.* HQ 30th Space Wing, Vandenberg Air Force Base, California 93437-6261. April.









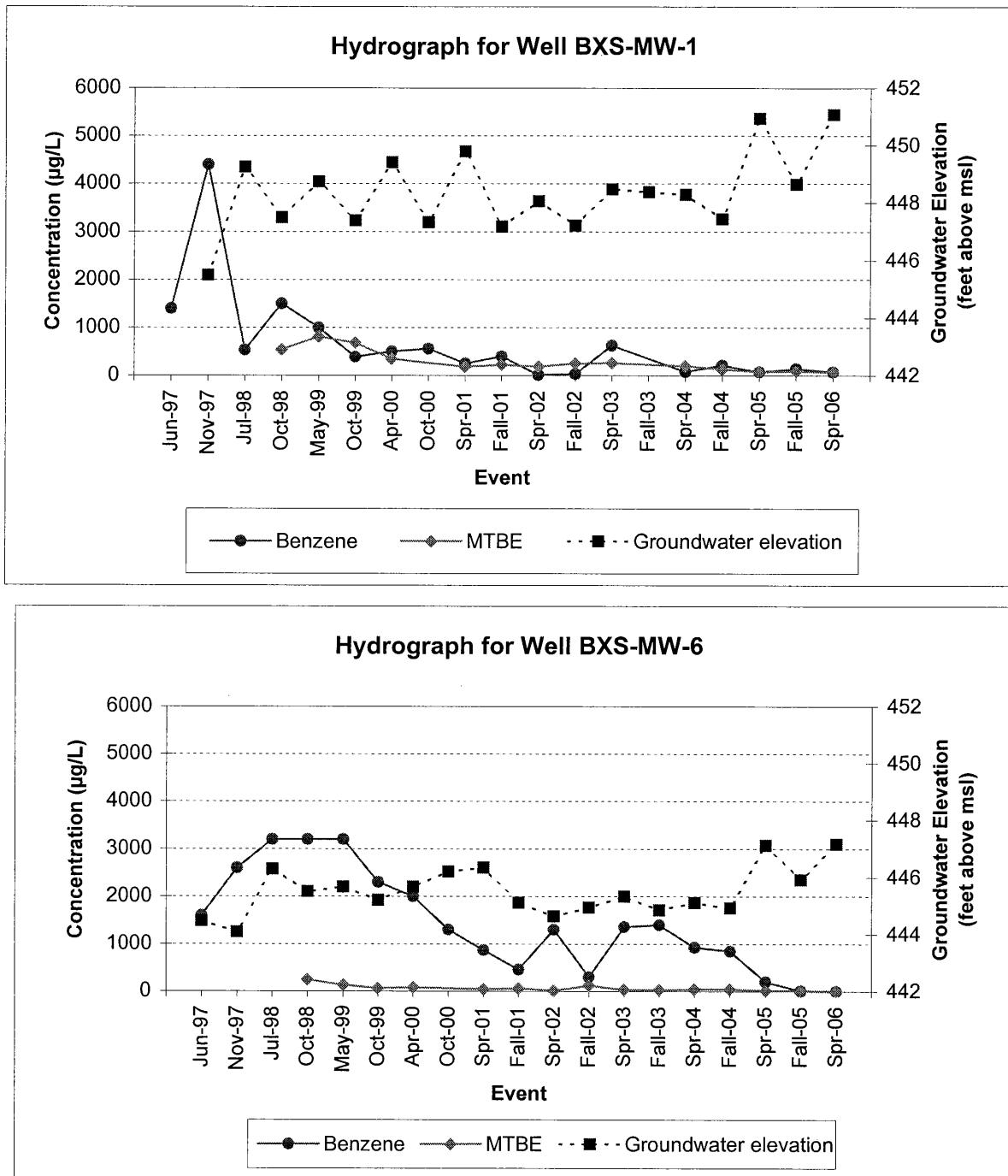


Figure 4. Historical Benzene and MTBE Concentrations at Site 1.

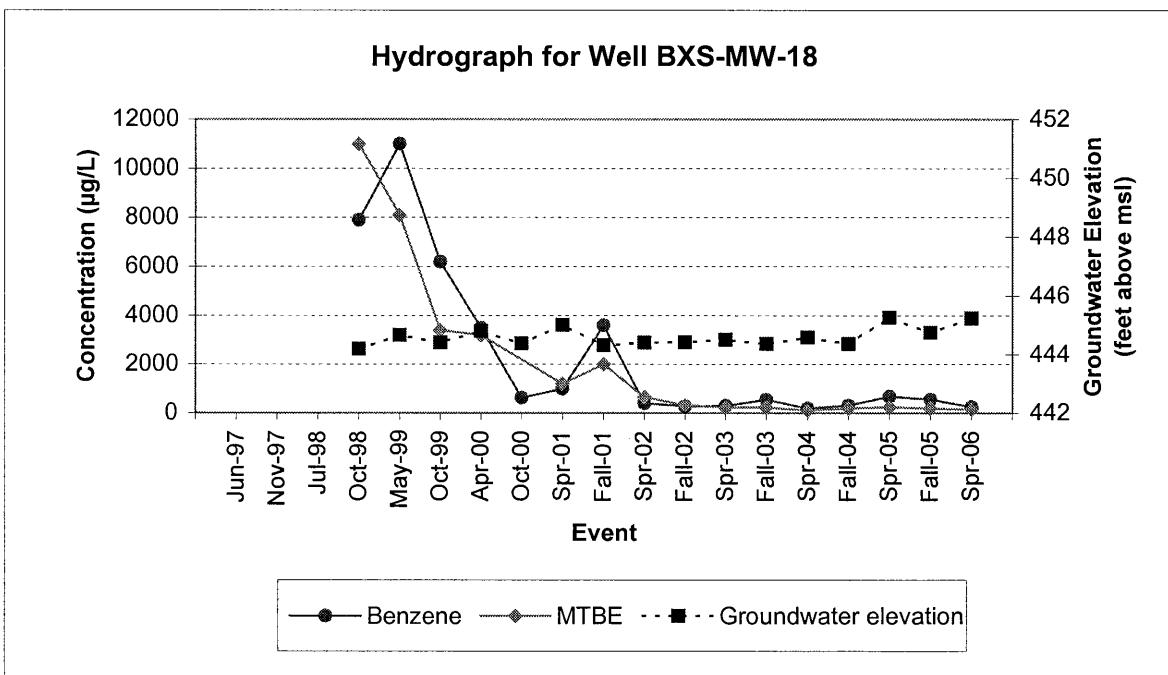
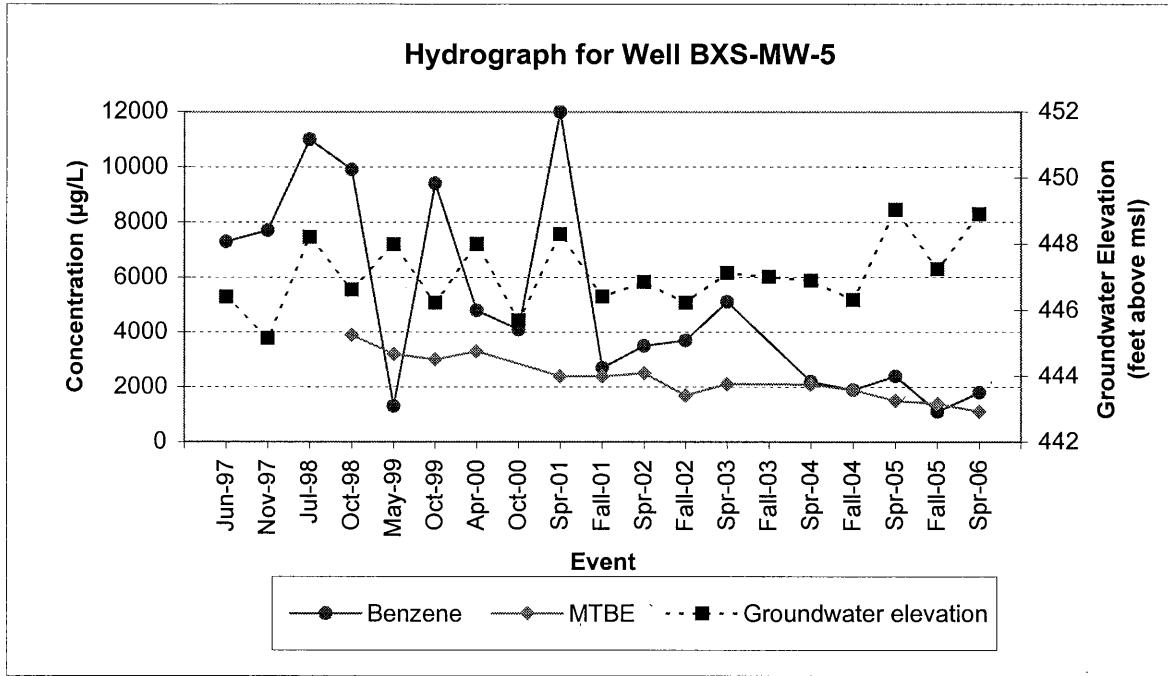


Figure 4 (continued). Historical Benzene and MTBE Concentrations at Site 1.

Table 1
Groundwater Elevations
IRP Site 1 (Base Exchange Service Station)
Vandenberg AFB, California

Monitoring Well	Top of Casing Elevation (feet above msl)	Date Measured	Depth (feet below TOC)	Groundwater			
				Spring 2006	Spring 2006	Spring 2006	Groundwater Elevation (feet above msl)
BXS-MW-1	454.09	03-May-06	3.01	451.08	448.65	450.94	447.44
BXS-MW-2	453.17	03-May-06	3.35	449.82	448.56	450.68	447.10
BXS-MW-3	452.99	03-May-06	1.52	451.47	448.64	451.26	447.09
BXS-MW-5	454.61	03-May-06	5.70	448.91	447.25	449.04	446.32
BXS-MW-6	453.52	03-May-06	6.35	447.17	445.92	447.13	444.93
BXS-MW-7	455.39	03-May-06	5.40	449.99	448.25	450.12	446.91
BXS-MW-13	453.81	03-May-06	3.81	450.00	448.08	450.54	446.69
BXS-MW-14	454.52	03-May-06	5.61	448.91	447.76	448.96	445.78
BXS-MW-15	453.17	03-May-06	5.91	447.26	446.09	446.25	444.91
BXS-MW-16	451.63	03-May-06	5.10	446.53	446.07	446.31	445.10
BXS-MW-17	453.15	03-May-06	3.87	449.28	447.36	449.23	447.27
BXS-MW-18	453.09	03-May-06	7.85	445.24	444.75	445.26	444.37
BXS-MW-19	453.99	03-May-06	5.42	448.57	447.41	448.75	445.80

Definition(s):

- msl - mean sea level
- TOC - top of well casing

Table 2
Water Quality Parameters
Spring 2006
IRP Site 1 (Base Exchange Service Station)
Vandenberg AFB, California

Sampling Location	BXS-MW-1	BXS-MW-2	BXS-MW-3	BXS-MW-5	BXS-MW-6	BXS-MW-7	BXS-MW-13
Sample ID	VBXSMW1	VBXSMW2	VBXSMW3	VBXSMW5	VBXSMW6	VBXSMW7	VBXSMW13
Collection Date	09-May-06						
Field Parameters¹:							
Temperature (° Celsius)	21.17	18.75	16.82	19.74	18.09	20.75	20.63
Conductivity (µmhos/cm)	2,255	784	1,056	1,289	1,635	725	1,027
pH	6.80	6.60	6.34	6.34	7.21	6.84	6.09
Turbidity (NTUs)	6.60	17.0	31.1	20.5	11.0	2.94	4.92

Sampling Location	BXS-MW-14	BXS-MW-15	BXS-MW-16	BXS-MW-17	BXS-MW-18	BXS-MW-19
Sample ID	VBXSMW14	VBXSMW15	VBXSMW16M	VBXSMW17	VBXSMW18	VBXSMW19
Collection Date	09-May-06	09-May-06	09-May-06	09-May-06	09-May-06	09-May-06
Field Parameters¹:						
Temperature (° Celsius)	17.05	19.86	18.14	16.91	17.04	19.66
Conductivity (µmhos/cm)	3,201	2,042	1,723	419	1,773	2,100
pH	6.56	6.68	6.43	6.56	6.09	6.56
Turbidity (NTUs)	2.19	3.86	3.86	6.31	9.74	6.79

Definition(s):

µmhos/cm - micromhos per centimeter
 NTU - nephelometric turbidity unit

Note(s):

- 1 - All field parameters were measured immediately before sampling.

Table 3
TPH in Groundwater
Spring 2006
EPA Method SW8015B (mg/L)
IRP Site 1 (Base Exchange Service Station)
Vandenberg AFB, California

Sample Location	Sample ID	Collection Date	TPH as Gasoline		
			MDL¹	0.02	PQL¹
BXS-MW-1	VBXSMW1	09-May-06	1.3	g	
BXS-MW-1	V99W644 (D)	09-May-06	1.6	g	
BXS-MW-2	VBXSMW2	09-May-06	83	g	
BXS-MW-3	VBXSMW3	09-May-06	0.02	U	g
BXS-MW-5	VBXSMW5	09-May-06	11	g	
BXS-MW-6	VBXSMW6	09-May-06	0.074	J	q
BXS-MW-7	VBXSMW7	09-May-06	0.42		g
BXS-MW-13	VBXSMW13	09-May-06	0.02	U	g
BXS-MW-14	VBXSMW14	09-May-06	0.02	U	g
BXS-MW-15	VBXSMW15	09-May-06	0.02	U	g
BXS-MW-16	VBXSMW16M	09-May-06	0.02	U	g
BXS-MW-17	VBXSMW17	09-May-06	0.02	U	g
BXS-MW-17	V99W645 (D)	09-May-06	0.02	U	g
BXS-MW-18	VBXSMW18	09-May-06	0.48		g
BXS-MW-19	VBXSMW19	09-May-06	0.02	U	g

Data Validity Qualifier(s):

- J - The analyte was positively identified and the result is usable; however, the analyte concentration is an estimated value.
- U - The analyte was not detected at or above the MDL.

Data Validity Comment(s):

- g - The data met prescribed criteria as detailed in the QAPP.
- q - The analyte detection was below the PQL.

Definition(s):

- (D) - duplicate sample
- MDL - method detection limit
- mg/L - milligrams per liter
- PQL - practical quantitation limit
- QAPP - Quality Assurance Project Plan
- TPH - total petroleum hydrocarbons

Note(s):

- 1 - Values from QAPP Addendum (Tetra Tech 2004).

Table 4
VOCs in Groundwater
Spring 2006
EPA Method SW8260B (µg/L)
IRP Site 1 (Base Exchange Service Station)
Vandenberg AFB, California

Sample Location	Sample ID	Collection Date	Primary MCL	BXS-MW-1 VBXSMW1 09-May-06	BXS-MW-1 V99W644 (D) 09-May-06	BXS-MW-2 VBXSMW2 09-May-06	BXS-MW-3 VBXSMW3 09-May-06	BXS-MW-5 VBXSMW5 09-May-06
			MDL ¹	PQL ¹				
1,1-DCE	0.32	1.0	6	0.2	U g	1	U g	0.2 U g
1,2-DCA	0.06	1.0	0.5	0.2	U g	51	J b	0.2 U g
2-Butanone	1.0	10	N/A	5	U g	25	U g	5 U g
Acetone	0.78	10	N/A	5	U g	5	U g	12 g
Benzene	0.07	0.4	1	72	g	25	U g	5 U g
Bromomethane	0.4	3.0	N/A	0.2	U g	71	g	15 B k
Carbon Disulfide	0.48	1.0	N/A	0.2	U g	0.2	U g	5 U g
Chloromethane	0.32	1.0	N/A	0.88	J b, q	0.2	U g	1,800 g
cis-1,2-DCE	0.21	1.0	6	0.2	U g	0.95	J q	0.2 U g
DIPE	0.16	5.0	N/A	17	J b	0.2	U g	0.2 U g
Ethylbenzene	0.12	1.0	300	160	g	16	g	0.21 J q
m,p-Xylenes	0.25	2.0	1,750 ²	71	g	1.50	g	0.21 J q
Methylene chloride	0.9	1.0	5	0.5	U g	3,100	g	32 g
MTBE	0.3	1.0	13 ³	68	g	48	g	0.2 U g
<i>o</i> -Xylene	0.13	1.0	1,750 ²	1.6	J b	1.4	g	0.2 U g
TBA	4.4	10.0	N/A	43	J b, f	26	J f	110 g
Toluene	0.11	1.0	150	7.2	J b	6.8	g	260 J q
TCE	0.18	1.0	5	0.2	U g	13,000	g	480 g
All other target analytes	N/A	N/A	N/A	ND	ND	13	J b	1.5 g
						ND	ND	1.4 g

Table 4
VOCs in Groundwater
Spring 2006
EPA Method SW8460B (µg/L)
IRP Site 1 (Base Exchange Service Station)
Vandenberg AFB, California

Sample Location	Sample ID	Collection Date	Primary				BXS-MW-15			
			MDL ¹	PQL ¹	MCL	BXS-MW-6 VBXSMW6	BXS-MW-7 VBXSMW7	BXS-MW-13 VBXSMW13	BXS-MW-14 VBXSMW14	BXS-MW-15 09-May-06
1,1-DCE	0.32	1.0	6	0.2	U g	0.2	U g	0.2	U g	0.2
1,2-DCA	0.06	1.0	0.5	0.2	U g	0.2	U g	0.2	U g	0.2
2-Butanone	1.0	10	N/A	5	U g	12	g	5	U g	5
Acetone	0.78	10	N/A	5	U g	5	U g	5	U g	5
Benzene	0.07	0.4	1	1.7	g	21	g	0.2	U g	0.2
Bromomethane	0.4	3.0	N/A	0.2	U g	0.2	U g	0.2	U g	0.2
Carbon Disulfide	0.48	1.0	N/A	0.58	J q	0.2	U g	0.2	U g	0.2
Chloromethane	0.32	1.0	N/A	0.2	U g	0.2	U g	0.2	U g	0.2
cis-1,2-DCE	0.21	1.0	6	0.2	U g	0.2	U g	0.2	U g	0.2
DIPE	0.16	5.0	N/A	4.2	J q	11	g	0.2	U g	0.2
Ethylbenzene	0.12	1.0	300	2.1	g	31	g	0.2	U g	0.2
<i>m,p</i> -Xylenes	0.25	2.0	1,750 ²	0.5	U g	9.9	g	0.5	U g	0.5
Methylene chloride	0.09	1.0	5	0.5	U g	0.5	U g	0.5	U g	0.5
MTBE	0.3	1.0	13 ³	7.4	g	10	g	0.2	U g	0.2
<i>o</i> -Xylene	0.13	1.0	1,750 ²	0.2	U g	0.38	J q	0.2	U g	0.2
TBA	4.4	10.0	N/A	5	U g	9.6	J q	5	U g	5
Toluene	0.11	1.0	150	0.2	U g	1.5	g	0.2	U g	0.2
TCE	0.18	1.0	5	0.2	U g	0.2	U g	0.2	U g	0.68
All other target analytes	N/A	N/A	N/A	ND	ND	ND	ND	ND	ND	ND

Table 4
VOCs in Groundwater
Spring 2006
EPA Method SW8260B (µg/L)
IRP Site 1 (Base Exchange Service Station)
Vandenberg AFB, California

Sample Location Sample ID Collection Date	MDL ¹	PQL ¹	Primary			V99W645 (D) 09-May-06	BXSMW18 09-May-06	BXSMW-17 09-May-06	V BXSMW17 09-May-06	BXSMW-19 09-May-06
			BXSMW-16 VBXSMW16M	BXSMW-17 VBXSMW17	BXSMW-17 V99W645 (D) 09-May-06					
1,1-DCE	0.32	1.0	6	0.2	U g	0.2	U g	0.2	J q	0.24
1,2-DCA	0.06	1.0	0.5	0.2	U g	0.2	U g	0.2	U g	0.4
2-Butanone	1.0	10	N/A	5	U g	5	U g	5	U g	5
Acetone	0.78	10	N/A	5	U g	5	U g	5	U g	5
Benzene	0.07	0.4	1	0.2	U g	0.2	U g	0.2	U g	250
Bromomethane	0.4	3.0	N/A	0.2	U g	0.2	U g	0.2	U g	0.2
Carbon Disulfide	0.48	1.0	N/A	0.2	U g	0.2	U g	0.2	U g	0.2
Chloromethane	0.32	1.0	N/A	0.2	U g	0.2	U g	0.2	U g	0.49
cis-1,2-DCE	0.21	1.0	6	0.2	U g	0.2	U g	0.2	U g	13
DIPE	0.16	5.0	N/A	0.2	U g	0.2	U g	0.2	U g	19
Ethylbenzene	0.12	1.0	300	0.2	U g	0.2	U g	0.2	U g	49
<i>m,p</i> -Xylenes	0.25	2.0	1,750 ²	0.5	U g	0.5	U g	0.5	U g	58
Methylene chloride	0.09	1.0	5	0.5	U g	0.5	U g	0.5	U g	0.5
MTBE	0.3	1.0	13 ³	0.2	U g	0.2	U g	0.2	U g	140
<i>o</i> -Xylene	0.13	1.0	1,750 ²	0.2	U g	0.2	U g	0.2	U g	16
TBA	4.4	10.0	N/A	5	U g	5	U g	5	U g	56
Toluene	0.11	1.0	150	0.2	U g	0.2	U g	0.2	U g	36
TCE	0.18	1.0	5	0.2	U g	0.2	U g	0.2	U g	3.1
All other target analytes	N/A	N/A	N/A	ND	ND	ND	ND	ND	ND	ND

Table 4
VOCs in Groundwater
Spring 2006
EPA Method SW8260B (µg/L)
IRP Site 1 (Base Exchange Service Station)
Vandenberg AFB, California

Data Validity Qualifier(s):	B	- The sample result is less than 5 times (10 times for common organic laboratory contaminants) the blank contamination. The result is considered not to have originated from the environmental sample, because cross-contamination is suspected.
	J	- The analyte was positively identified and the result is usable; however, the analyte concentration is an estimated value.
	U	- The analyte was not detected at or above the MDL.
Data Validity Comment(s):	b	- The surrogate spike recovery was outside quality control criteria.
	f	- The duplicate/replicate sample's relative percent difference was outside the control limit.
	g	- The data met prescribed criteria as detailed in the QAPP.
	k	- The analyte was found in a field blank.
	q	- The analyte detection was below the PQL.
Definition(s):	(D)	- duplicate sample
	DCA	- dichloroethane
	DCE	- dichloroethene
	DIPE	- diisopropyl ether
	MCL	- maximum contaminant level
	MDL	- method detection limit
	µg/L	- micrograms per liter
	MTBE	- methyl <i>tert</i> -butyl ether
	N/A	- not applicable
	ND	- not detected; result is less than the MDL
	PQL	- practical quantitation limit
	QAPP	- Quality Assurance Project Plan
	TBA	- <i>tert</i> -butanol
	TCE	- trichloroethene

Note(s):

Bold type indicates results that were above the MCL.

The California Department of Health Services notification level for TBA is 12 µg/L.

1 - Values from QAPP Addendum (Tetra Tech 2004).

2 - MCL of 1,750 µg/L applies to sum of *m*-xylene, *o*-xylene, and *p*-xylene.

3 - The secondary MCL for MTBE is 5 µg/L.

Table 5
Summary of Key Contaminants of Concern
IRP Site 1 (Base Exchange Service Station)
Vandenberg AFB, California

	Oct-98	May-99	Oct-99	Apr-00	Spr-01	Fall-01	Spr-02	Fall-02	Spr-03	Fall-03	Spr-04	Fall-04	Spr-05	Fall-05	Spr-06	Benzene (µg/L) ^a		
																Benzene (µg/L) ^a	Ethylbenzene (µg/L) ^b	
BXS-MW-1	1,500	1,000	390	500	250	400	13	32	628	NA	79	210	76	140	72			
BXS-MW-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5,300	4,500	4,100	4,300	3,100			
BXS-MW-3	NA	NA	NA	NA	NA	NA	ND	5.5	0.42	ND	1.4	1.4	2.7	ND	ND			
BXS-MW-5	9,900	13,000	9,400	4,800	12,000	2,700	3,500	5,110	NA	2,200	1,400	930	850	2,400	1,100	1,800		
BXS-MW-6	3,200	3,200	2,300	2,000	870	460	1,300	300	1,360	1,400	70	225	NA	100	170	340	42	
BXS-MW-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	260	ND	ND	ND	ND	ND	21	
BXS-MW-13	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	0.32	ND	ND	ND	ND	ND		
BXS-MW-14	3.7	ND	ND	0.31	ND	ND												
BXS-MW-15	NA	ND	0.5	ND	ND	ND	ND	ND	ND	ND	0.44	ND	0.38	ND	ND	ND		
BXS-MW-16	NA	ND	0.3	ND	ND	ND	ND	ND	ND	ND	1.97	ND	ND	ND	ND	ND		
BXS-MW-17	0.23	ND	ND	NA	ND	ND	ND	ND	ND	ND	1.11	ND	ND	ND	ND	ND		
BXS-MW-18	7,900	11,000	6,200	3,500	1,000	3,600	410	270	303.0	552	200	303	220	680	560	250		
BXS-MW-19	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	3.53	ND	ND	1.9	ND	ND		

Table 5

**Summary of Key Contaminants of Concern
IRP Site 1 (Base Exchange Service Station)
Vandenberg AFB, California**

	MTBE (µg/L) ^c												Toluene (µg/L) ^d																
	Oct-98	May-99	Oct-99	Apr-00	Spr-01	Fall-01	Spr-02	Fall-02	Spr-03	Fall-03	Spr-04	Fall-04	Spr-05	Fall-05	Spr-06	Oct-98	May-99	Oct-99	Apr-00	Spr-01	Fall-01	Spr-02	Fall-02	Spr-03	Fall-03	Spr-04	Fall-04	Spr-05	Fall-05
BXS-MW-1	540	810	680	350	180	220	190	250	260	NA	200	130	81	91	68														
BXS-MW-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND														
BXS-MW-3	0.5	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND														
BXS-MW-5	3,900	3,200	3,000	3,300	2,400	2,400	1,700	2,120	NA	2,100	1,900	1,500	1,400	1,400	1,100														
BXS-MW-6	240	130	65	83	45	61	15	120	34.0	28.7	47	46	15	15	7.4														
BXS-MW-7	NA	NA	NA	NA	NA	NA	NA	660	290	491	NA	240	230	13	29														
BXS-MW-13	NA	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND														
BXS-MW-14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND														
BXS-MW-15	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND														
BXS-MW-16	NA	ND	ND	ND	ND	ND	5.7	ND	ND	ND	ND	ND	ND	ND	ND														
BXS-MW-17	ND	ND	1	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND														
BXS-MW-18	11,000	8,100	3,400	3,200	1,200	2,000	660	330	233	232	110	200	250	190	140														
BXS-MW-19	NA	NA	NA	NA	NA	NA	NA	34	22	40.9	11.1	15	20	29	17														

Table 5
Summary of Key Contaminants of Concern
IRP Site 1 (Base Exchange Service Station)
Vandenberg AFB, California

	Total Xylenes ($\mu\text{g/L}$) ^e						m,p-Xylene ($\mu\text{g/L}$) ^f								
	Oct-98	May-99	Oct-99	Apr-00	Spr-01	Fall-01	Spr-02	Fall-02	Spr-03	Fall-03	Spr-04	Fall-04	Spr-05	Fall-05	Spr-06
BXS-MW-1	900	920	72	131.2	370	280	ND	9.4	40.2	NA	2.7	41	9.5	17	71
BXS-MW-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10,000	3,900	380	9,700	12,000
BXS-MW-3	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	14	5.4	8	ND	ND
BXS-MW-5	3,220	4,600	2,930	460	3,100	30	200	260	176	NA	79	43	410	24	410
BXS-MW-6	940	1,410	1,490	3,300	3,500	1,900	5,500	2,700	5,530	5,480	4,600	5,200	1,400	4.2	ND
BXS-MW-7	NA	NA	NA	NA	NA	NA	NA	48	11	24.2	NA	6.6	27	73	18
BXS-MW-13	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
BXS-MW-14	1.24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BXS-MW-15	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.46	ND	ND	ND	ND
BXS-MW-16	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BXS-MW-17	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BXS-MW-18	2,610	4,220	610	81.8	17	130	ND	38	1.13	41.0	1	2.4	55	24	58
BXS-MW-19	NA	NA	NA	NA	NA	NA	ND	ND	2.61	ND	ND	2.7	ND	ND	ND
Total Xylenes ($\mu\text{g/L}$) ^e													o-Xylene ($\mu\text{g/L}$) ^f		
	Oct-98	May-99	Oct-99	Apr-00	Spr-01	Fall-01	Spr-02	Fall-02	Spr-03	Fall-03	Spr-04	Fall-04	Spr-05	Fall-05	Spr-06
BXS-MW-1	900	920	72	131.2	3.9	5.6	ND	5.5	1.16	NA	0.37	0.7	0.86	1.1	1.6
BXS-MW-2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3,700	3,400	3,100	4,000	4,700
BXS-MW-3	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	4.6	1.7	3.4	ND	ND
BXS-MW-5	3,220	4,600	2,930	460	850	3	23	62	19.9	NA	7.5	9.7	120	3.7	110
BXS-MW-6	940	1,410	1,490	3,300	2,000	1,200	3,100	2,690	2,690	2,400	2,800	610	2.6	ND	ND
BXS-MW-7	NA	NA	NA	NA	NA	NA	10	2.8	1.82	NA	1.1	4.6	6	0.89	0.38
BXS-MW-13	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND
BXS-MW-14	1.24	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BXS-MW-15	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BXS-MW-16	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BXS-MW-17	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BXS-MW-18	2,610	4,220	610	81.8	19	4.9	ND	6.1	0.70	1.92	0.34	0.22	14	0.85	16
BXS-MW-19	NA	NA	NA	NA	NA	NA	ND	ND	0.37	ND	ND	0.78	ND	ND	ND

Table 5
Summary of Key Contaminants of Concern
IRP Site 1 (Base Exchange Service Station)
Vandenberg AFB, California

	TPH as Gasoline (mg/L)														
	Oct-98	May-99	Oct-99	Apr-00	Spr-01	Fall-01	Spr-02	Fall-02	Spr-03	Fall-03	Spr-04	Fall-04	Spr-05	Fall-05	Spr-06
BXS-MW-1	7.9	4.3	3.7	3	5.8	7.8	2.6	1.5	2.81	NA	0.68	1.4	0.92	0.8	1.6
BXS-MW-2	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	60	77	73	75	83
BXS-MW-3	50	NA	NA	NA	NA	NA	ND	0.03	ND	0.063	0.035	0.058	ND	ND	ND
BXS-MW-5	21	22	17	14	33	10	28	10	9.03	NA	1.6	2.3	2.4	0.92	11
BXS-MW-6	6.6	6	8.9	12	23	7.9	53	18	37.1	34.4	39	35	8.4	0.18	0.074
BXS-MW-7	NA	NA	NA	NA	NA	NA	4.7	1.3	1.88	NA	0.33	1.6	2.3	0.64	0.42
BXS-MW-13	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	ND
BXS-MW-14	NA	NA	0.057	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
BXS-MW-15	NA	0.06	0.043	ND	ND	ND	ND	ND	ND	0.06	ND	ND	ND	ND	ND
BXS-MW-16	NA	0.085	0.054	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BXS-MW-17	ND	0.06	0.059	NA	ND	ND	ND								
BXS-MW-18	15	22	14	9.7	10	7.9	4.5	2.1	1.10	1.27	0.12	0.42	0.74	0.41	0.48
BXS-MW-19	NA	NA	NA	NA	NA	NA	0.18	ND	0.05	0.03	ND	ND	ND	ND	ND

Definition(s):

- $\mu\text{g/L}$ - micrograms per liter
- mg/L - milligrams per liter
- MTBE - methyl *tert*-butyl ether
- NA - not analyzed
- ND - not detected; result is less than the method detection limit.
- TPH - total petroleum hydrocarbons

Note(s):

Bold type indicates results that were above the MCL.

- a - The MCL for benzene is 1 $\mu\text{g/L}$.
- b - The MCL for ethylbenzene is 300 $\mu\text{g/L}$.
- c - The MCL for MTBE is 13 $\mu\text{g/L}$.
- d - The MCL for toluene is 150 $\mu\text{g/L}$.
- e - The MCL for total xylenes is 1,750 $\mu\text{g/L}$.
- f - The MCL of 1,750 $\mu\text{g/L}$ applies to sum of *m*-xylene, *o*-xylene, and *p*-xylene.

APPENDIX A

PURGE RECORDS



TETRA TECH, INC.
4213 State Street STE 100
Santa Barbara, CA 93110
Telephone (805) 681-3100
Telefax (805) 681-3108

GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

Page 1 of 1

DATE <u>5/19/06</u>	SITE NUMBER <u>1</u>	PURGING DEVICE	MICRODURGE DEDICATED PUMP									
PROGRAM NAME <u>B-G-m9</u>	TRIP BLANK I.D. <u>V1TB12.31</u>	SAMPLING DEVICE	MICRODURGE DEDICATED PUMP									
MONITORING WELL IDENTIFICATION <u>BK5-Mw-1</u>	DUPPLICATE I.D. / COLLECTION TIME <u>199W644/1700</u>	PID READING IN CASING (ppm)	(initial) <u>0</u> (vented to) <u>0</u>									
SAMPLE I.D. <u>VBKSMW1</u>	STATIC WATER LEVEL (ft btoc) <u>3.19</u>	PID READING IN BREATHING ZONE (ppm)	(initial) <u>0</u> (vented to) <u>0</u>									
WATER COLUMN (feet) <u>21.9</u>	TOTAL WELL DEPTH (ft btoc) <u>25.1</u>	SAMPLER'S SIGNATURE <u>John Deas</u>										
PUMP & TUBING (V) (L) <u>0.59</u>	TUBING DIAMETER (in) <u>5 V (L)</u>	5 V (L) <u>2.95</u>										
Time	Activity	Water Level (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (L)	Pump & Tubing Volumes Purged	Flow Rate (LPM)
1232	Arrived at well	—	—	—	—	—	—	—	—	—	—	—
1237	Begin Purge	—	—	—	—	—	—	—	—	—	—	—
1240	<u>3.58</u>	<u>19.17</u>	<u>22.17</u>	<u>6.82</u>	<u>5.32</u>	<u>1.32</u>	<u>-82.9</u>	<u>clear</u>	<u>0.72</u>	<u>1.22</u>	<u>0.24</u>	<u>0.24</u>
1243	<u>3.51</u>	<u>20.18</u>	<u>22.25</u>	<u>6.82</u>	<u>5.90</u>	<u>1.14</u>	<u>-82.2</u>	<u>clear</u>	<u>1.44</u>	<u>2.44</u>	<u>—</u>	<u>—</u>
1246	<u>3.51</u>	<u>20.56</u>	<u>22.41</u>	<u>6.82</u>	<u>7.17</u>	<u>0.95</u>	<u>-82.9</u>	<u>clear</u>	<u>3.16</u>	<u>3.66</u>	<u>—</u>	<u>—</u>
1249	<u>3.51</u>	<u>21.17</u>	<u>22.55</u>	<u>6.80</u>	<u>6.60</u>	<u>0.57</u>	<u>-82.2</u>	<u>clear</u>	<u>3.88</u>	<u>4.88</u>	<u>—</u>	<u>—</u>
1250	<u>End Purge</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>3.12</u>	<u>5.28</u>	<u>—</u>	<u>—</u>
1255	<u>Sample</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>
1300	<u>Vacated well</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>—</u>

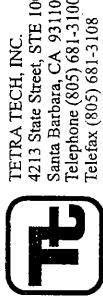
Fe+2 (ppm) — Taken immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 3.51 FILTER LOT # —

Comments: _____

PARAMETERS FOR WATER QUALITY STABILIZATION			
Temperature	± 1 C (1.8 F)	Conductivity	$\pm 5\%$
pH	± 0.1	Turbidity	5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.



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GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

Page 1 of 1

DATE	<u>5/19/08</u>	SITE NUMBER	<u>1</u>	PURGING DEVICE	2" SUBMERSIBLE GRUNDEOS PUMP		
PROGRAM NAME	<u>3409P</u>	TRIP BLANK I.D.	<u>VIT81211</u>	SAMPLING DEVICE	DISPOSABLE TEFLON BAILER		
MONITORING WELL IDENTIFICATION	<u>VIT81211</u>	DUPLICATE I.D. / COLLECTION TIME	<u>- 1 -</u>	PID READING IN CASING (ppm)	(initial)	<u>446</u>	(vented to) <u>36.4</u>
SAMPLE I.D.	<u>3409-111-2</u>	TOTAL WELL DEPTH (ft btoc)	<u>168</u>	PID READING IN BREATHING ZONE (ppm)	(initial)	<u>0.0</u>	(vented to) <u>0.0</u>
STATIC WATER LEVEL (ft btoc)	<u>2.55</u>	CASING DIAMETER (in)	<u>2</u>	SAMPLER'S SIGNATURE	<u>M. H. H.</u> <u>Dan Reid</u>		
WATER COLUMN (feet)	<u>16.1</u>	3 V (gals)	<u>7.8</u>	BAILER BOX #	<u>107</u>		
Time	Activity	Water Level (ft btoc)	Pump Depth (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)
1300	Arrived at well	—	—	—	—	—	—
1307	Begin Purge	18	—	—	—	—	—
1312	6:30 AM	31.23	1002	6.58	27.1	4.43	-70.0
1317	7.33	16.17	6.65	6.51	4.83	1.05	-100.2
1322	8.18	16.01	6.23	6.58	5.28	0.97	-86.7
1327	Rec'd from JY	8.11	16.04	6.57	6.60	4.33	0.91
1332	Rec'd from JY	8.30	14.02	8.24	6.60	4.00	0.52
1337	8.45	18.75	7.84	6.60	17.0	0.86	-93.0
1342	End Purge	—	—	—	—	—	—
1348	Sample	4.50	—	13.57	6.71	13.0	1.53
1405	Vacated well	—	—	—	—	—	—

Fe+2 (ppm) — Taken from first bailer immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 4.50

FILTER LOT # —

Comments: 5.36 msl. btoc

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature $\pm 1^\circ\text{C}$ (1.8 F)	Conductivity $\pm 5\%$
pH ± 0.1	Turbidity 5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.



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GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

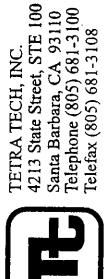
Page 1 of 1

DATE	<u>5/1/06</u>	SITE NUMBER	<u>VIRB 131</u>	PURGING DEVICE	2" SUBMERSIBLE GRUNDFOS PUMP								
PROGRAM NAME	<u>Bump</u>	TRIP BLANK I.D.	<u>011-1111-3</u>	SAMPLING DEVICE	DISPOSABLE TEFILON BAILER								
MONITORING WELL IDENTIFICATION	<u>VIRB 131</u>	DUPLICATE I.D. / COLLECTION TIME	<u>-/-</u>	PID READING IN CASING (ppm)	<u>0.0</u>	(initial)	<u>0.0</u>						
SAMPLE I.D.	<u>VIRB 131</u>	STATIC WATER LEVEL (ft btoc)	<u>1.55</u>	PID READING IN BREATHING ZONE (ppm)	<u>0.0</u>	(initial)	<u>0.0</u>						
TOTAL WELL DEPTH (ft btoc)	<u>21.0</u>	WATER COLUMN (feet)	<u>19.4</u>	WELL VOLUME (V) (gals)	<u>3.16</u>	CASING DIAMETER (in)	<u>9.48</u>						
				BAILER BOX #	<u>207</u>	SAMPLER'S SIGNATURE	<u>Mash Mash Dane Seijo</u>						
Time	Activity	Water Level (ft btoc)	Pump Depth (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (gals)	Well Volumes Purged	Flow Rate (GPM)
1105	Arrived at well	—	—	—	—	—	—	—	—	—	—	—	—
1110	Begin Purge	—	<u>20.5</u>	—	—	—	—	—	—	—	—	—	<u>0.5</u>
1115		<u>8.85</u>	<u>17.75</u>	<u>16.71</u>	<u>6.35</u>	<u>*</u>	<u>4.52</u>	<u>-33.0</u>	<u>Cloudy</u>	<u>1.50</u>	<u>0.79</u>		
1120		<u>11.10</u>	<u>16.94</u>	<u>10.51</u>	<u>6.45</u>	<u>18.3</u>	<u>0.51</u>	<u>-10.5</u>	<u>Cloudy</u>	<u>5.00</u>	<u>1.58</u>		
1125		<u>13.10</u>	<u>16.77</u>	<u>11.16</u>	<u>6.47</u>	<u>19.5</u>	<u>0.51</u>	<u>-184.6</u>	<u>Cloudy</u>	<u>7.50</u>	<u>2.37</u>		
1130		<u>15.10</u>	<u>16.71</u>	<u>8.91</u>	<u>6.42</u>	<u>35.8</u>	<u>0.58</u>	<u>-171.3</u>	<u>Cloudy</u>	<u>10.50</u>	<u>3.16</u>		
1135		<u>13.41</u>	<u>16.91</u>	<u>10.56</u>	<u>6.34</u>	<u>31.1</u>	<u>1.20</u>	<u>-159.5</u>	<u>Cloudy</u>	<u>13.50</u>	<u>3.45</u>		
1138	End purge; well purge off	—	<u>16.11</u>	—	<u>17.51</u>	<u>14.71</u>	<u>6.47</u>	<u>400</u>	<u>3.34</u>	<u>Cloudy</u>	—	—	
1145	Vacated well	—	—	—	—	—	—	—	—	—	—	—	

Fe+2 (ppm) — Taken from first bailey immediately before sampling.
WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 19.11 FILTER LOT #: —
Comments: * Turbidity; Meter malfunction; batteries replaced to 6000!

PARAMETERS FOR WATER QUALITY STABILIZATION			
Temperature $\pm 1^{\circ}\text{C}$ (1.8 F)	Conductivity $\pm 5\%$	pH ± 0.1	Turbidity 5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.



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GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

Page 1 of 1

DATE	<u>5/6/06</u>	SITE NUMBER	<u>1</u>	PURGING DEVICE	2" SUBMERSIBLE GRUNDEOS PUMP								
PROGRAM NAME	<u>TRIP</u>	TRIP BLANK I.D.	<u>VIT01231</u>	SAMPLING DEVICE	DISPOSABLE TEFILON BAILER								
MONITORING WELL IDENTIFICATION	<u>Rxs-MW-5</u>	DUPLICATE I.D. / COLLECTION TIME	<u>-/-</u>	PID READING IN CASING (ppm)	<u>417</u>	(vented to)	<u>0.0</u>						
SAMPLE I.D.	<u>V8XSMW5</u>	TOTAL WELL DEPTH (ft bico)	<u>31.6</u>	PID READING IN BREATHING ZONE (ppm)	<u>0.0</u>	(initial)	<u>0.0</u>						
STATIC WATER LEVEL (ft bico)	<u>5.67</u>	CASING DIAMETER (in)	<u>1</u>	SAMPLER'S SIGNATURE	<u>Dave Seizing</u>								
WATER COLUMN (feet)	<u>15.9</u>	WELL VOLUME (V) (gals)	<u>2.6</u>	3 V (gals)	<u>7.8</u>	BAILER BOX #	<u>207</u>						
Time	Activity	Water Level (ft bico)	Pump Depth (ft bico)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (gals)	Well Volumes Purged	Flow Rate (GPM)
1100	Arrived at well	—	—	—	—	—	—	—	—	—	—	—	—
1208	Begin Purge	—	<u>21</u>	—	—	—	—	—	—	—	—	—	<u>0.5</u>
1213		<u>7.49</u>	<u>16.13</u>	<u>1042</u>	<u>6.37</u>	<u>33.6</u>	<u>7.10</u>	<u>-83.6</u>	<u>Clear</u>	<u>2.50</u>	<u>0.96</u>	<u>1</u>	
1218		<u>11.00</u>	<u>12.93</u>	<u>6.34</u>	<u>62.4</u>	<u>1.10</u>	<u>-113.3</u>	<u>Cloudy</u>	<u>5.00</u>	<u>1.92</u>	<u>1</u>		
1223		<u>13.71</u>	<u>14.70</u>	<u>6.48</u>	<u>135</u>	<u>1.15</u>	<u>-90.7</u>	<u>Cloudy</u>	<u>7.50</u>	<u>2.88</u>	<u>1</u>		
1228		<u>17.07</u>	<u>16.74</u>	<u>1286</u>	<u>6.34</u>	<u>20.5</u>	<u>0.94</u>	<u>-108.7</u>	<u>Clear</u>	<u>16.00</u>	<u>3.85</u>	<u>1</u>	
1231	<u>End purging well purget 65.</u>	<u>14.74</u>	<u>18.51</u>	<u>1379</u>	<u>6.77</u>	<u>19.5</u>	<u>3.81</u>	<u>-35.3</u>	<u>Clear</u>	<u>—</u>	<u>—</u>	<u>—</u>	
1240	<u>Sample</u>	<u>14.74</u>	<u>—</u>	<u>18.51</u>	<u>1379</u>	<u>6.77</u>	<u>19.5</u>	<u>3.81</u>	<u>-35.3</u>	<u>Clear</u>	<u>—</u>	<u>—</u>	
1250	Vacated well	—	—	—	—	—	—	—	—	—	—	—	

Fe+2 (ppm) — Taken from first bailer immediately before sampling.

WATER LEVEL (ft bico) AT TIME OF SAMPLING: 14.74 FILTER LOT #: —

Comments: _____

PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature $\pm 1^\circ\text{C}$ (1.8 F)	Conductivity $\pm 5\%$
pH ± 0.1	Turbidity 5 NTU

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.



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GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

Page 1 of 1

DATE		SITE NUMBER	PURGING DEVICE		MICROURGE DEDICATED PUMP	
PROGRAM NAME		TRIP BLANK I.D.	SAMPLING DEVICE		MICROURGE DEDICATED PUMP	
MONITORING WELL IDENTIFICATION		<u>BX5-MW-6</u>				
SAMPLE I.D.	DUPLICATE I.D. / COLLECTION TIME	<u>VBS5mw6</u>	PID READING IN CASING (ppm)	(initial)	<u>0.0</u>	(vented to)
STATIC WATER LEVEL (ft btoc)	TOTAL WELL DEPTH (ft btoc)	<u>6.35</u>	PID READING IN BREATHING ZONE (ppm)	(initial)	<u>0.0</u>	(vented to)
WATER COLUMN (feet)	TUBING DIAMETER (in)	<u>10.3</u>	SAMPLER'S SIGNATURE	<u>Ripon Doss</u>		
PUMP & TUBING (V) (L)		<u>0.59</u>	5 V (L)	<u>2.95</u>		
Time	Activity	Water Level (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)
1025	Arrived at well	—	—	—	—	—
1038	Begin Purge	—	—	—	—	—
1042	—	<u>6.63</u>	<u>19.54</u>	<u>2017</u>	<u>7.13</u>	<u>16.5</u>
1046	—	<u>6.65</u>	<u>18.27</u>	<u>1782</u>	<u>7.16</u>	<u>13.8</u>
1050	—	<u>6.71</u>	<u>18.09</u>	<u>1635</u>	<u>7.21</u>	<u>11.0</u>
1051	End Purge	—	—	—	—	—
1100	Sample	—	—	—	—	—
1105	Vacated well	—	—	—	—	—

Fe+2 (ppm) — Taken immediately before sampling

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 6.72 FILTER LOT #: —

Comments: _____

PARAMETERS FOR WATER QUALITY STABILIZATION		
Temperature	± 1 C (1.8 F)	Conductivity $\pm 5\%$
pH	± 0.1	Turbidity 5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.



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GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

DATE	<u>5/9/06</u>	SITE NUMBER	<u>1</u>	PURGING DEVICE	2" SUBMERSIBLE GRUNDFOS PUMP		
PROGRAM NAME	<u>B6MP</u>	TRIP BLANK I.D.	<u>VITB 1231</u>	SAMPLING DEVICE	DISPOSABLE TEFILON BAILER		
MONITORING WELL IDENTIFICATION	<u>BXS-MW-7</u>	DUPLICATE I.D. / COLLECTION TIME	<u>-/-</u>	PID READING IN CASING (ppm)	(initial) <u>0.0</u>	(vented to) <u>0.0</u>	X:\JR\Drive\field\Work\field\Coordination\formats\Tool030\field\Data\Log_Sheet_Grundfos.xls
SAMPLE I.D.	<u>BXSnew7</u>	STATIC WATER LEVEL (ft btoc)	<u>5.43</u>	PID READING IN BREATHING ZONE (ppm)	(initial) <u>0.0</u>	(vented to) <u>0.0</u>	
WATER COLUMN (feet)	<u>16.57</u>	TOTAL WELL DEPTH (ft btoc)	<u>22.0</u>	SAMPLER'S SIGNATURE	<u>Brett Rose</u>		
WELL VOLUME(V) (gals)	<u>2.05</u>	CASING DIAMETER (in)	<u>2</u>	BAILER BOX #	<u>207</u>		
3 V (gals)	<u>7.95</u>						

Time	Activity	Water Level (ft btoc)	Pump Depth (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (gals)	Well Volumes Purged	Flow Rate (GPM)
1140	Arrived at well	—	—	—	—	—	—	—	—	—	—	—	—
1147	Begin Purge	—	2.2	—	—	—	—	—	—	—	—	—	0.5
1152	—	7.94	2.2	19.92	6.85	6.80	11.0	1.75	-139.0	clear	2.5	0.94	0.5
1157	—	9.50	2.2	20.23	7.0	6.60	15.6	0.65	-101.3	clear	5.0	1.88	0.5
1202	—	11.80	2.2	20.43	6.97	6.68	3.53	0.46	-106.6	clear	7.5	2.83	0.5
1207	—	13.60	2.2	20.74	6.98	6.76	4.69	0.45	-110.6	clear	10.0	3.77	0.5
1212	—	14.40	2.2	20.80	7.35	6.82	3.20	0.37	-116.1	clear	12.5	4.71	0.5
1216	—	15.38	2.2	20.75	7.25	6.84	2.94	0.36	-116.4	clear	14.5	5.47	0.5
1217	END Purge (5 volumes purged)	—	—	—	—	—	—	—	—	—	—	—	—
1245	Sample	8.44	—	20.67	666	7.37	4.87	5.19	-59.1	clear	—	—	—
1255	Vacated well	—	—	—	—	—	—	—	—	—	—	—	—

F+2 (ppm) — Taken from first bailer immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 8.44

FILTER LOT #: —

Comments:

PARAMETERS FOR WATER QUALITY STABILIZATION			
Temperature	± 1 C (1.8 F)	Conductivity	$\pm 5\%$
pH	± 0.1	Turbidity	5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.



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GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

Page 1 of 1

DATE 5/9/06 SITE NUMBER 1
PROGRAM NAME B6mp TRIP BLANK I.D. VIT31231
MONITORING WELL IDENTIFICATION BX5-MW-13
SAMPLE I.D. V BX5MW13 DUPLICATE I.D. / COLLECTION TIME —
STATIC WATER LEVEL (ft htoc) 3.86 TOTAL WELL DEPTH (ft htoc) 20.2
WATER COLUMN (feet) 16.3 TUBING DIAMETER (in) 1/4
PUMP & TUBING (V) (L) 0.16 5 V (L) 0.48

Time	Activity	Water Level (ft htoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (L)	Pump & Tubing Volumes Purged	Flow Rate (LPM)
1155	Arrived at well	—	—	—	—	—	—	—	—	—	—	—
1210	Begin Purge	—	—	—	—	—	—	—	—	—	—	—
1212	3.96	20.87	13.17	6.24	4.15	2.59	80.9	clear	0.42	2.62	✓	0.21
1214	4.01	20.71	10.77	6.17	4.86	2.52	84.2	—	0.84	5.25	✓	—
1216	4.01	20.63	10.27	6.09	4.92	2.47	108.1	—	1.26	7.87	✓	—
1217	End Purge	—	—	—	—	—	—	—	—	—	—	—
1225	Sample	—	—	—	—	—	—	—	—	—	—	—
1230	Vacated well	—	—	—	—	—	—	—	—	—	—	—

Fe+2 (ppm) — Taken immediately before sampling.

WATER LEVEL (ft htoc) AT TIME OF SAMPLING: 4.01 FILTER LOT # —
Comments: _____

PARAMETERS FOR WATER QUALITY STABILIZATION		
Temperature ± 1 C (1.8 F)	Conductivity $\pm 5\%$	Turbidity ± 0.1 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.



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GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

Page 1 of 1

DATE		SITE NUMBER	PURGING DEVICE	MICROURGE DEDICATED PUMP								
PROGRAM NAME	TRIP BLANK I.D.	VITB 1231	SAMPLING DEVICE	MICROPURGE DEDICATED PUMP								
MONITORING WELL IDENTIFICATION		<u>BKS-MW-14</u>	PID READING IN CASING (ppm)	(initial) <u>0</u> (vented to) <u>0</u>								
SAMPLE I.D.	DUPLICATE I.D. / COLLECTION TIME	-	PID READING IN BREATHING ZONE (ppm)	(initial) <u>0</u> (vented to) <u>0</u>								
STATIC WATER LEVEL (ft btoc)	TOTAL WELL DEPTH (ft btoc)	<u>5.60</u>										
WATER COLUMN (feet)	TUBING DIAMETER (in)	<u>14.5</u>	SAMPLER'S SIGNATURE	<u>R. J. D.</u>								
PUMP & TUBING (V) (L)	5 V (L)	<u>0.59</u>										
Time	Activity	Water Level (ft btoc)	Temp (Deg. C)	EC ($\mu\text{mhos/cm}$)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (L)	Pump Tubing Volumes Purged	Flow Rate (LPM)
0945	Arrived at well											
0951	Begin Purge											
1000		<u>5.81</u>	<u>16.80</u>	<u>3114</u>	<u>6.99</u>	<u>13.7</u>	<u>0.55</u>	<u>160.3</u>	<u>Clear</u>	<u>0.6</u>	<u>1</u>	
1003		<u>5.82</u>	<u>16.94</u>	<u>3150</u>	<u>6.51</u>	<u>9.64</u>	<u>0.55</u>	<u>149.2</u>	<u>Clear</u>	<u>1.2</u>	<u>2</u>	
1006		<u>5.83</u>	<u>17.05</u>	<u>3201</u>	<u>6.56</u>	<u>2.19</u>	<u>0.53</u>	<u>134.2</u>	<u>Clear</u>	<u>1.8</u>	<u>3</u>	
1007	End Purge											
1015	Sample											
1020	Vacated well											

Fe+2 (ppm) - Taken immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 5.83 FILTER LOT # -

Comments: _____

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PARAMETERS FOR WATER QUALITY STABILIZATION

Temperature $\pm 1^\circ \text{C}$ (1.8 F)	Conductivity $\pm 5\%$
pH ± 0.1	Turbidity 5 NTUS

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.



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GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

Page 1 of 1

DATE	<u>5/9/06</u>	SITE NUMBER	<u>1</u>	PURGING DEVICE	2" SUBMERSIBLE GRUNDFOS PUMP		
PROGRAM NAME	<u>Bcomp</u>	TRIP BLANK I.D.	<u>VITB1231</u>	SAMPLING DEVICE	DISPOSABLE TEFLON BAILER		
MONITORING WELL IDENTIFICATION	<u>Bxs-MW-15</u>	DUPPLICATE I.D. / COLLECTION TIME	<u>—</u>	PID READING IN CASING (ppm)	(initial) <u>0.0</u>	(vented to) <u>0.0</u>	XTRP DriveField WorkField Coordination Form TS050 Field Data Log Sheet Grundfos ai.mif
SAMPLE I.D.	<u>VBSM15</u>	STATIC WATER LEVEL (ft btoc)	<u>6.11</u>	PID READING IN BREATHING ZONE (ppm)	(initial) <u>0.0</u>	(vented to) <u>0.0</u>	Conductivity $\pm 5\%$
WATER COLUMN (feet)	<u>14.01</u>	TOTAL WELL DEPTH (ft btoc)	<u>20.2</u>				pH ± 0.1
WELL VOLUME(V) (gals)	<u>9.16</u>	CASING DIAMETER (in)	<u>4"</u>	SAMPLER'S SIGNATURE	<u>Jeff Brown</u>		
							Turbidity 5 NTUs

Time	Activity	Water Level (ft btoc)	Pump Depth (ft btoc)	Temp (Deg. C)	EC (μ mhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (gals)	Well Volumes Purged	Flow Rate (GPM)
0950	Arrived at well	—	—	—	—	—	—	—	—	—	—	—	—
1015	Begin Purge	—	20	—	—	—	—	—	—	—	—	—	1.0
1020	—	8.91	20	19.36	2045	6.55	60.6	1.17	101.3	cloudy	5.0	0.55	1.0
1025	—	10.73	20	19.58	2061	6.62	12.2	0.66	97.8	clear	10.0	1.09	1.0
1030	—	11.74	20	19.60	2109	6.63	5.69	0.44	95.0	clear	15.0	1.64	1.0
1035	—	16.21	20	19.63	2067	6.66	6.32	0.54	92.5	clear	20.0	2.18	1.0
1040	—	11.00	20	19.86	2042	6.68	3.86	0.64	89.9	clear	25.0	2.73	1.0
1042	END WELL DRY	—	—	—	—	—	—	—	—	—	—	—	—
1055	SAMPLE	18.04	—	19.12	2029	7.06	10.7	6.68	110.1	clear	—	—	—
1158	Vacated well	—	—	—	—	—	—	—	—	—	—	—	—

F+2 (ppm) — Taken from first bailer immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 18.04 FILTER LOT #: —

Comments: * W.L. Meter reading may have been off due to
meter conductivity setting at a high setting.

TD = 20.21 bgs

PARAMETERS FOR WATER QUALITY STABILIZATION			
Temperature $\pm 1^\circ \text{C}$ (1.8 F)	—	Conductivity $\pm 5\%$	—
pH ± 0.1	—	Turbidity 5 NTUs	—

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.



TETRA TECH, INC.
4213 State Street, STE 100
Santa Barbara, CA 93110
Telephone (805) 681-3100
Telefax (805) 681-3108

GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

Page 1 of 1

DATE <u>5/19/06</u>		SITE NUMBER <u>1</u>	PURGING DEVICE	MICROPURGE DEDICATED PUMP								
PROGRAM NAME <u>B6mp</u>	TRIP BLANK I.D. <u>VITB1231</u>	SAMPLING DEVICE	MICROPURGE DEDICATED PUMP									
MONITORING WELL IDENTIFICATION <u>VBX5Mw16#</u>	DUPLICATE I.D. / COLLECTION TIME <u>-</u>	PID READING IN CASING (ppm)	(initial) <u>56.3*</u>	(vented to) <u>13.5*</u>								
SAMPLE I.D. <u>VBX5Mw16#</u>	STATIC WATER LEVEL (ft btoc) <u>5.21</u>	PID READING IN BREATHING ZONE (ppm)	(initial) <u>0.0</u>	(vented to) <u>0.0</u>								
	TOTAL WELL DEPTH (ft btoc) <u>20.2</u>											
WATER COLUMN (feet) <u>15.0</u>	TUBING DIAMETER (in) <u>3/8</u>	SAMPLER'S SIGNATURE <u>John</u>										
PUMP & TUBING (V) (L) <u>0.6</u>	5 V (L) <u>3.0</u>											
Time	Activity	Water Level (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (L)	Pump & Tubing Volumes Purged	Flow Rate (LPM)
1106	Arrived at well											
1115	Begin Purge											
1118	<u>5.42</u>	<u>18.62</u>	<u>173.4</u>	<u>6.49</u>	<u>6.78</u>	<u>1.53</u>	<u>-29.1</u>	<u>clear</u>	<u>0.63</u>	<u>1.1</u>	<u>0.21</u>	
1121	<u>5.43</u>	<u>18.49</u>	<u>173.5</u>	<u>6.51</u>	<u>4.41</u>	<u>1.48</u>	<u>-4.1</u>			<u>1.26</u>	<u>2.1</u>	
1124	<u>5.46</u>	<u>18.14</u>	<u>172.3</u>	<u>6.93</u>	<u>3.86</u>	<u>1.07</u>	<u>16.8</u>			<u>1.89</u>	<u>3.2</u>	
1125	<u>End Purge</u>											
1130	<u>Sample</u>											
1135	Vacated well											

Fe+2 (ppm) - Taken immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 5.48 FILTER LOT # -

Comments: A p10 reading suspected to be H₂O vapor causing false hits

PARAMETERS FOR WATER QUALITY STABILIZATION			
Temperature	± 1 C (1.8 F)	Conductivity	$\pm 5\%$
pH	± 0.1	Turbidity	5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.



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GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

Page 1 of 1

DATE	<u>5/9/06</u>	SITE NUMBER	<u>1</u>	PURGING DEVICE	MICROTURGE DEDICATED PUMP			
PROGRAM NAME	<u>B6np</u>	TRIP BLANK I.D.	<u>VITB12.31</u>	SAMPLING DEVICE	MICROPURGE DEDICATED PUMP			
MONITORING WELL IDENTIFICATION	<u>VBXSMW17</u>	DUPLICATE I.D. / COLLECTION TIME	<u>V99W645/1/05</u>	PID READING IN CASING (ppm)	(initial)	<u>0</u>	(vented to)	<u>0</u>
SAMPLE I.D.	<u>Bx5-mw-17</u>	STATIC WATER LEVEL (ft btoc)	<u>4.01</u>	PID READING IN BREATHING ZONE (ppm)	(initial)	<u>0</u>	(vented to)	<u>0</u>
WATER COLUMN (feet)	<u>16.2</u>	TOTAL WELL DEPTH (ft btoc)	<u>20.2</u>					
PUMP & TUBING (V) (L)	<u>0.64</u>	TUBING DIAMETER (in)	<u>3/8</u>	SAMPLER'S SIGNATURE	<u>R. Finch</u>			
				5V (L)	<u>3.20</u>			
Time	Activity	Water Level (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
1325	Arrived at well							
1330	Begin Purge							
1335		<u>4.22</u>	<u>17.13</u>	<u>492</u>	<u>6.61</u>	<u>8.71</u>	<u>1.19</u>	<u>4.7</u>
1340		<u>4.23</u>	<u>16.94</u>	<u>429</u>	<u>6.54</u>	<u>7.54</u>	<u>0.90</u>	<u>21.5</u>
1345		<u>4.22</u>	<u>16.11</u>	<u>419</u>	<u>6.56</u>	<u>6.31</u>	<u>0.81</u>	<u>23.8</u>
1346	End Purge							
1350	Sample							
1355	Vacated well							

Fe+2 (ppm) — Taken immediately before sampling.

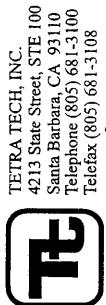
WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 4.22

FILTER LOT # —

Comments: _____

PARAMETERS FOR WATER QUALITY STABILIZATION					
Temperature ± 1 C (1.8 F)	Conductivity $\pm 5\%$				
pH ± 0.1	Turbidity 5 NTUS				

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.



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GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

Page 1 of 1

DATE	SITE NUMBER	PURGING DEVICE	MICROPURGE DEDICATED PUMP									
<u>5/9/06</u>	<u>VBXSTB1231</u>	<u>SAMPLING DEVICE</u>	<u>MICROPURGE DEDICATED PUMP</u>									
PROGRAM NAME	TRIP BLANK I.D.	PID READING IN CASING (ppm)	(initial) <u>0</u> (vented to) <u>0</u>									
MONITORING WELL IDENTIFICATION	<u>BX5-MW-18</u>	PID READING IN BREATHING ZONE (ppm)	(initial) <u>0</u> (vented to) <u>0</u>									
SAMPLE I.D.	<u>V BXSMW 18</u>											
DUPLICATE I.D. / COLLECTION TIME	<u>-</u>											
STATIC WATER LEVEL (ft btoc)	<u>7.86</u>	TOTAL WELL DEPTH (ft btoc)	<u>16.3</u>									
WATER COLUMN (feet)	<u>8.4</u>	TUBING DIAMETER (in)	<u>3/8</u>									
PUMP & TUBING (V) (L)	<u>0.6</u>	5 V (L)	<u>3.0</u>									
SAMPLER'S SIGNATURE <u>R. S. D. S.</u>												
Time	Activity	Water Level (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (L)	Pump & Tubing Volumes Purged	Flow Rate (LPM)
1400	Arrived at well											
1410	Begin Purge											
1414		<u>8.02</u>	<u>17.00</u>	<u>17.01</u>	<u>6.09</u>	<u>9.27</u>	<u>0.99</u>	<u>54.5</u>	<u>clear</u>	<u>0.96</u>	<u>1.6</u>	<u>0.24</u>
1418		<u>8.04</u>	<u>16.99</u>	<u>17.51</u>	<u>6.08</u>	<u>10.3</u>	<u>0.50</u>	<u>53.4</u>		<u>1.92</u>	<u>3.2</u>	
1422		<u>8.15</u>	<u>17.04</u>	<u>17.73</u>	<u>6.09</u>	<u>9.34</u>	<u>0.36</u>	<u>44.8</u>		<u>2.88</u>	<u>4.8</u>	
1423	End Purge									<u>3.12</u>	<u>5.2</u>	
1430	Sample											
1435	Vacated well											

Fe+2 (ppm) - Taken immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 8.16 FILTER LOT #: -

Comments:

PARAMETERS FOR WATER QUALITY STABILIZATION		
Temperature	± 1 C (1.8 F)	Conductivity $\pm 5\%$
pH	± 0.1	Turbidity 5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.



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GROUNDWATER MONITORING WELL
FIELD DATA LOG SHEET - PURGING

Page 1 of 1

DATE	<u>5/9/06</u>	SITE NUMBER	<u>1</u>
PROGRAM NAME	<u>B6MP</u>	TRIP BLANK I.D.	<u>V1TB1231</u>
MONITORING WELL IDENTIFICATION	<u>BX5-MW-19</u>	PURGING DEVICE	<u>2" SUBMERSIBLE GRUNDFOS PUMP</u>
SAMPLE I.D.	<u>UBX5MW19</u>	SAMPLING DEVICE	<u>DISPOSABLE TEFILON BAILER</u>
DUPLICATE I.D. / COLLECTION TIME	<u>5.32</u>	PID READING IN CASING (ppm)	<u>(initial) 0.0 (vented to) 0.0</u>
STATIC WATER LEVEL (ft btoc)	<u>4.8</u>	PID READING IN BREATHING ZONE (ppm)	<u>(initial) 0.0 (vented to) 0.0</u>
WATER COLUMN (feet)	<u>9.61</u>	SAMPLER'S SIGNATURE	<u>Brian J. Dowd</u>
WELL VOLUME(V) (gals)	<u>3 V (gals)</u>	CASING DIAMETER (in)	<u>28.82 BAILER BOX # 07</u>

Time	Activity	Water Level (ft btoc)	Pump Depth (ft btoc)	Temp (Deg. C)	EC (µmhos/cm)	pH	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)	Color	Volume Purged (gals)	Well Volumes Purged	Flow Rate (GPM)
1100	Arrived at well	—	—	—	—	—	—	—	—	—	—	—	—
1110	Begin Purge	—	20	—	—	—	—	—	—	—	—	—	—
1115	—	8.05	20	19.20	1695	6.59	3.28	0.86	115.0	clear	5.0	0.52	1.0
1120	—	9.69	20	19.25	1610	6.46	8.07	0.86	118.0	clear	10.0	1.04	1.0
1125	—	11.24	20	19.25	1585	6.48	5.58	0.55	117.0	clear	15.0	1.56	1.0
1130	—	12.70	20	19.22	1564	6.48	3.76	0.44	113.0	clear	20.0	2.08	1.0
1135	—	14.90	20	19.21	1665	6.55	3.98	0.35	111.0	clear	25.0	2.60	1.0
1140	—	17.69	20	19.46	1978	6.60	6.79	0.60	109.9	clear	30.0	3.12	1.0
1145	—	19.10	20	19.66	2100	6.56	—	0.75	107.0	clear	35.0	3.64	1.0
1146	Well Purged Done	—	—	—	—	—	—	—	—	—	—	—	—
1320	Sample 13.60	—	20.31	2342	6.81	34.2	4.57	110.0	clear	—	—	—	—
1325	Vacated well	—	—	—	—	—	—	—	—	—	—	—	—

Fe+2 (ppm) — Taken from first bailey immediately before sampling.

WATER LEVEL (ft btoc) AT TIME OF SAMPLING: 17.0

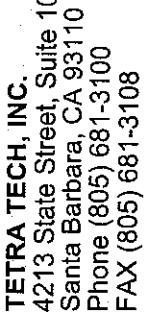
Comments: _____

PARAMETERS FOR WATER QUALITY STABILIZATION			
Temperature	+1 °C (1.8 F)	Conductivity	+5%
pH	±0.1	Turbidity	5 NTUs

Note: All water levels and pump depths are measured from the notch in the top of the well casing. If volatiles are detected above background in the breathing zone during the initial screening, the breathing zone will be periodically monitored during purging and sampling activities.

APPENDIX B

CHAIN-OF-CUSTODY RECORDS



SHIPPED TO: EMAX Labs

1835 West 205th Street

06E072

CHAIN OF CUSTODY RECORD

Torrance, CA 90501

4213 State Street, Suite 100
Santa Barbara, CA 93110
Phone (805) 681-3100
FAX (805) 681-3108

V/W 01-14/16

CLIENT Vandenberg AFB

PROJECT NAME	ANALYTICAL METHODS	TURN-AROUND TIME:		
		Standard	OBSERVATIONS/COMMENTS:	
PROJECT MANAGER	Kevin McNamara			
TC#	990105-06 99/71-06			
SAMPLERS (Signatures)	X <i>[Signature]</i> X <i>[Signature]</i>			
SAMPLE NO.	DATE	TIME		
1 VBXSMW18	5/9/06	1430		WG 7
2 VBXSMW17		1350		7 7
3 VBXSMW6		1100		7 7
4 V99W644		1700		7 7
5 V99W645		1705		7 7
6 VBXSMW14		1015		7 7
7 VBXSMW1		255		7 7
8 VBXSMW13		225		7 7
9 VBXSMW16M		1130		21 7
10 VBXSMW2		1350		ms / msD
MATRIX TYPE:	CONTAINER TYPE:	PRESERVATIVES:	TEMPERATURE BLANK:	TOTAL NUMBER OF CONTAINERS
S = Soil	G = Glass	All samples are preserved at 4°C.	YES	84 / 121
W = Water	SS = Stainless Steel	Water samples are preserved as indicated on the sample labels.	NO	
SD = Sediment	P = Plastic			
RELINQUISHED BY: <i>Jac-Lin E</i>	SIGNATURE: <i>Jac-Lin E</i>	COMPANY: TETRA TECH, INC.	DATE: 5/10/06	TIME: 11:20
RECEIVED BY: <i>A. G. Hallinan</i>	SIGNATURE: <i>A. G. Hallinan</i>	COMPANY: Emax	DATE: 5/10/06	TIME: 11:20
RELINQUISHED BY: <i>A. G. Hallinan</i>	SIGNATURE: <i>A. G. Hallinan</i>	COMPANY: Emax	DATE: 5/10/06	TIME: 13:49
RECEIVED BY: <i>J - Luna</i>	SIGNATURE: <i>J - Luna</i>	COMPANY: Emax	DATE: 5/10/06	TIME: 13:49

